A comparison of the nutritional knowledge of dental, dietetic and nutrition students

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VERIFIABLE CPD PAPER

IN BRIEF

- Considers an important aspect of dental training previously overlooked (compared with medicine).
- Reports that dental students with little education in nutrition are generally as confident as nutritionists in giving advice - which could lead to problems.
- Provides a framework (questionnaire) on which other studies could be based.

EDUCATION

Conflicts in dietary messages remain widespread. Such conflicts can have negative effects on the behaviour, motivation and attitudes of individuals. Inconsistencies in dietary advice may be linked to inadequate training of professionals. Literature suggests that the nutrition training of dentists and oral health training of dietitians and nutritionists is limited. This study was designed to provide information on the nutritional knowledge of dental, dietetic and nutrition students and how this conforms to national nutritional guidelines, identifying differences between professional groups and conflicts in undergraduate training. Self-administered questionnaires were completed by 124 dental, dietetic and nutrition students at Cardiff University and the University of Wales Institute, Cardiff (UWIC). Significant inter-group differences ($p < 0.05$) were observed in relation to recommendations concerning the between-mealtime consumption of a wide range of snacks and drinks. Dental students were mainly concerned with oral health problems (for example, acid erosion), while dietetic and nutrition students were mainly concerned with general health problems (for example, obesity). Just over a third of dental students felt that they had received sufficient training in the dietary management of patients. In conclusion, a common risk-factor approach and consistent nutrition guidelines are essential to improve health. In addition, recommendations should be made to incorporate oral health into the training of nutritionists and general health into the training of dentists.

INTRODUCTION

Although the oral health of the United Kingdom population has generally improved over past decades, dental caries still remains a significant public health problem.[1] In 2003, a survey of the dental health of children found that 43% of five-year-olds had caries experience in primary teeth, while 49% of 15-year-olds had caries experience in the permanent dentition.[1]

Although interventions to change behaviour have enormous potential to alter disease patterns, no common strategic approach is currently taken across government, the National Health Service and other sectors; on the contrary, many different models, methods and theories are used in an uncoordinated way.[2] In recognition of this, a number of authors have called for consistent health messages to be made available to the public and highlighted the need for dietary advice for oral health to be in line with dietary advice for general health.[3,4] To ensure reliable dietary advice is given it is essential that the education and training of health professionals, including dentists and nutritionists, has a consistent approach.[5]

A recent study found dietary advice provided by general dental practitioners to lack consistency of content and quality of delivery.[5] It may be speculated that this reflects inadequate training in the field, particularly at the undergraduate level;[6] indeed, there is growing evidence that the nutrition content of dental and medical courses is inadequate. The core nutrition curriculum for health professionals, launched by the Department of Health in 1993[7] and adopted by the Chief Medical Officer, Chief Nursing Officer, Chief Pharmacist and Chief Dentist, outlined the minimal nutrition learning outcomes for these health professionals. In 2001, it was reported that, while advances had been made with regard to nutrition training in the medical curriculum, little attention had been paid to how nutrition is incorporated into dental training in the United Kingdom.[8]

The problem of inconsistency, however, extends beyond medicine and dentistry. In a survey of the dental nutrition knowledge of nutritionists, only 50% recognised that dental caries is caused by a bacterial infection, and 66% incorrectly linked severity of caries to total sugar concentration in foods.[9] At the beginning of the last decade, a review of nutrition training for health professionals and local authority officers[10] suggested that there was great potential for the nutrition content of all courses to be further developed.

The objectives of this study were to:

- Assess how the nutritional knowledge of dental, dietetic and nutrition students conforms to national nutritional guidelines
- Establish whether differences exist between these professional groups
- Identify conflicts in undergraduate training.

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MATERIALS AND METHODS

This study consisted of a questionnaire survey of fourth- and fifth-year undergraduate students of dentistry, second- and third-year undergraduate students of public health nutrition and first-year postgraduate students of dietetics recruited from Cardiff University and the University of Wales Institute, Cardiff. Participants were selected via a non-probability purposive sampling strategy to ensure that the sample included an appropriate range of demographic characteristics according to the research population.[11] The student year groups were selected because they were considered to have gained adequate experience and training to be able to complete the questionnaire. The study was approved by the Cardiff University Medical Dental School Research Ethics Committee.

Questions were designed to target four main topics:

1. *Diet advice questions* focused on the nature of the diet advice given by respondents as trainee professionals to patients or the wider population, for example, '*From the following snacks which ones would you suggest to a patient to eat in between mealtimes?: fresh fruits and vegetables; bread; cheese cubes; dried fruit; pasta, rice and starchy staple foods; sugar and chocolate confectionery (candy); low-sugar breakfast cereals; sugar-free confectionery (sugar free candy); crisps (potato chips); and cakes and biscuits (cookies)?*'. Subsequently, respondents were asked to indicate which of these items they would not recommend and specify the disease process they think the food may lead to
2. Questions on *the relevance and importance that the students place on diet advice*: respondents were asked to show their level of agreement with a range of statements on the importance of diet, nutritional, general and oral health, the contribution of dental teams in improving general health, and conflicts in nutritional health messages. Example statements included '*Modification of the diet can prevent many disease processes*' and '*A common risk factor approach will deliver health improvement*'
3. Questions concerning the *training and experience* of respondents in the giving of dietary advice to patients and the wider population. For example '*Do you feel you have had sufficient training in the dietary management of patients?*' and '*Would you feel confident giving dietary advice to patients?*'
4. *Conflicting dietary messages* questions: respondents were asked how they felt consistent dietary messages could be achieved. An example question: '*How do you feel these conflicts may be resolved to achieve consistent dietary messages?: Involving all professionals; improved training and education of undergraduates; improved training of nutritionists; improved training of dentists; improved dietary guidelines; taking no action.*'

Questions were designed using general nutritional information from the Food Standards Agency[12] and specific dietary recommendations for avoiding dental erosion and caries.[3]

The majority of questions were closed so that categories could be analysed efficiently and with minimum bias. Face validity was checked by asking experts to scrutinise the questions, while content validity was checked by ensuring that the questions covered all areas of knowledge mapped out by the initial objectives.[13] Questions were reworded and repeated in different sections of the questionnaire to test the reliability of the instrument.[14] An informal pilot was undertaken in which peers and colleagues were asked to complete the questionnaire. Minor changes were made to the original questionnaire as a result of the pilot study, for example, emphasising instructions to respondents by emboldening text and clarifying questions by using language more familiar to respondents. Response rates were maximised by distributing second copies of the questionnaire to non-respondents.[15]

The study design attempted to minimise the limitations of self-completed questionnaires by:

- Formulating questions using lay terms
- Spreading out questions so that they were uncluttered and broken down into different sections
- Attaching a cover letter explaining the details of the study, giving instructions on completing the questionnaire and including contact details for researchers in case of further questions
- Having a researcher present for further clarification of ambiguous questions
- Having a collection box to allow respondents to anonymously return questionnaires.

Data were analysed using descriptive frequencies, crosstabulations of categorical variables, and calculation of Fisher's exact probability test, with an alpha value of 0.05, for differences between populations.

RESULTS

One hundred and sixty-four questionnaires were distributed (111 to fourth- and fifth-year dental students, 12 to postgraduate dietetic students, and 41 to second- and third-year nutrition students). One hundred and twenty-four (75.6%) of these were returned (74 from dental students, 12 from dietetic students and 38 from nutrition students). In the subsequent analyses, unless otherwise stated, dietetic and nutrition students were grouped together due to the similarity of the nutrition content of their degree programmes.

Diet advice

Figure 1 illustrates the eating habits that respondents considered to be part of a healthy diet. Significant inter-group differences were observed in relation to: eating only three to four meals a day ($p < 0.001$); limiting the frequency of sugar intake ($p = 0.014$); drinking fruit juices between meals ($p = 0.003$); having short frequent meals ($p = 0.02$); eating dried fruit between meals ($p < 0.0001$).

A significantly greater proportion (98.0%, $p < 0.001$) of dietetic and nutrition students based their diet advice on evidence from nutritional guidelines compared with dental students (18.1%). Students cited the following guidelines: Food Standards Agency (37.3%, n = 44); Department of Health (33.9%, n = 40); Health Education Authority (14.4%, n = 17); Other (11.9%, n = 14). Included in this latter category were guidelines produced by the British Dietetic Association, National Institute for Health and Clinical Excellence, World Health Organisation, and Committee on Medical Aspects of Food Policy.

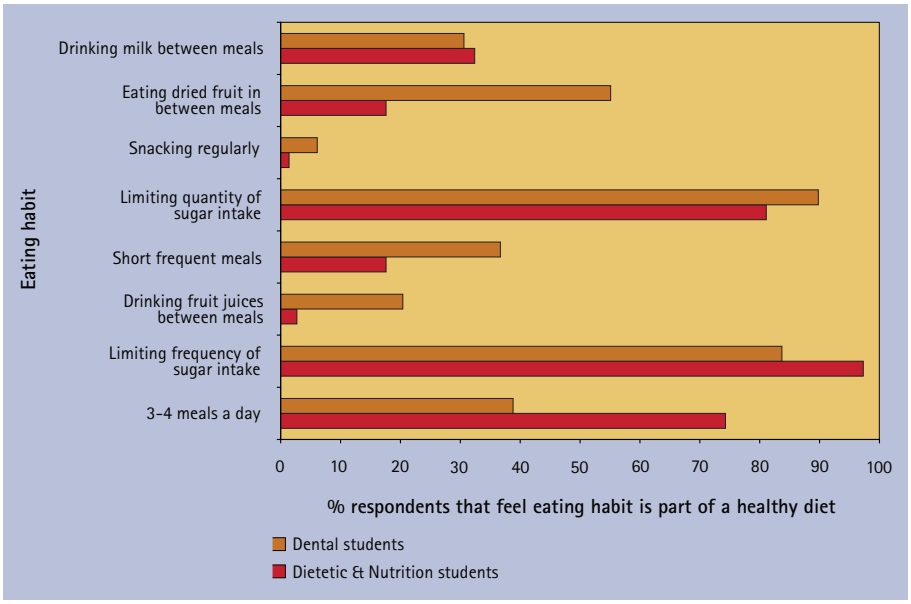

Fig. 1 Eating habits considered by respondents to be part of a healthy diet

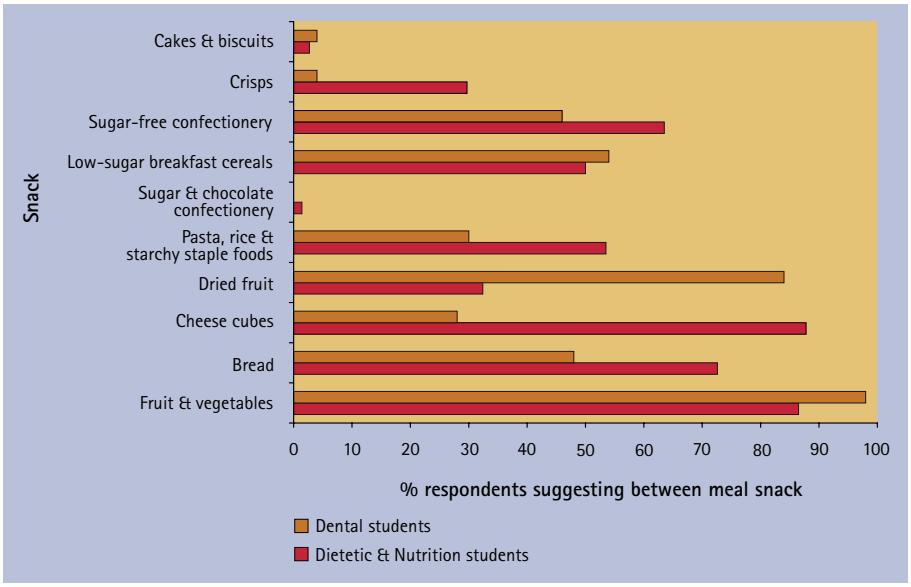

Fig. 2 Percentage respondents suggesting snack as suitable between meals

Between-meal snacks

Figure 2 illustrates the foods that respondents would suggest to patients as between-meal snacks. Significant inter-group differences were observed in relation to the recommendation of the following snacks: fresh fruit and vegetables ($p = 0.049$); bread ($p = 0.008$); cheese cubes ($p < 0.001$); dried fruit ($p < 0.001$); pasta, rice and starchy staple foods ($p = 0.015$); crisps ($p < 0.001$). For between-meal snacks like sugar and chocolate confectionery and cakes/biscuits, dental students were mainly concerned with oral health-related problems such as erosion. In contrast dietetic and nutrition students gave more general health-related problems, such as obesity, as the reason for avoiding specific between-meal snacks.

Only 5.4% (n = 4) of dental students compared with 32.0% (n = 16) of dietetic and nutrition students thought that cheese might lead to general health problems. Likewise, only 28.4% (n = 21) of dental students in comparison with 64.0% (n = 32) of dietetic and nutrition students related crisps to general health problems. Conversely, a majority (52.7%, n = 39) of dental students compared with only 4.0% (n = 2) of dietetic and nutrition students thought that consumption of dried fruit might lead to oral health problems. The greatest inter-group difference was seen in relation to consumption of sugar and chocolate confectionery, 67.6% (n = 50) of dental students but only 8.0% (n = 4) of dietetic and nutrition students being concerned about oral health problems. Similarly, large differences were seen in relation to consumption of cakes/biscuits, 54.1% (n = 40) of dental students compared with only 2.0% (n = 1) of dietetic and nutrition students associating cakes/biscuits with oral health problems.

Between-meal drinks

Figure 3 illustrates which drinks the respondents would suggest patients drink between meals. A significant inter-group difference was observed in relation to the recommendation of the following drinks: fresh fruit juices ($p < 0.001$); unsweetened tea and coffee ($p = 0.004$) and sweetened tea and coffee ($p = 0.001$). Again, students were mainly concerned with disease processes related to their particular area of expertise rather than taking a holistic view of the patient.

The majority of dental students (73.0%, n = 54) related fresh fruit juices to oral health problems compared with only 16.0% (n = 8) of dietetic and nutrition students. In relation to tea and coffee (sweetened), most dental students (74.3%, n = 55) were concerned about oral health problems compared with only 14.0% (n = 7) of dietetic and nutrition students; 8.0% (n = 4) of dietetic and nutrition students were concerned about both oral and general health problems. Consideration of the consumption of wine gave rise to quite large inter-group differences: 48.6% (n = 36) of dental students related it to oral health problems while 32.0% (n = 16) of dietetic and nutrition students related it to general health problems. Only five students from both groups were concerned about both oral and general health problems. A consideration of alcopops (beverages containing distilled alcohol and added ingredients such as fruit juices or other flavourings) and cider showed similar trends. The greatest inter-group differences were seen in relation to cola and other sugared soft drinks: 74.3% (n = 55) of dental students were solely concerned with oral health compared with 26.0% (n = 13) of dietetic and nutrition students. Few dental students (5.4%, n = 4) and dietetic and nutrition students (18.0%, n = 9) were concerned about both oral and general health.

Relevance and importance of diet advice

Figure 4 shows students' agreement with a range of statements regarding the relevance and importance of diet advice. There were no significant inter-group differences.

Training and experiences

The majority (82.4%; n = 61) of dental students claimed that they had received between zero and four hours of training. Only 35.1% (n = 26) felt that they had received sufficient training in the dietary management of patients. When asked whether they felt confident about giving dietary advice to patients, the following levels of confidence were apparent in the three professional groups: dental students 64.9% (n = 48), dietetic students 83.3% (n = 10) and nutrition students 57.9% (n = 22) (this equates to 64% (n = 32) for nutrition and dietetics students combined).

Conflicts

The majority of respondents (82.5%, n = 99) either agreed or strongly agreed that conflicts exist between the health messages and dietary advice provided by different healthcare professionals. Furthermore, an even larger proportion of the respondents (94.3%, n = 115) either agreed or strongly agreed that conflicts in health messages might have a negative effect on the behaviour, motivation and attitudes of an individual.

The majority of the students supported the options given to resolve conflicts in dietary messages, the most favoured being 'improving training and education of undergraduates in dietary advice'. Other options given included: involving all professionals in healthy eating advice; improving training of nutritionists in the role of diet in oral health; improving training of dentists in the role of diet in general health and improving dietary guidelines. Other options suggested by respondents in free text included: *'having a moderator to check across the board that all advice correlates'; 'improving referrals'; 'producing leaflets'; 'simplifying and standardising the learning material'; 'working as a complete team'.*

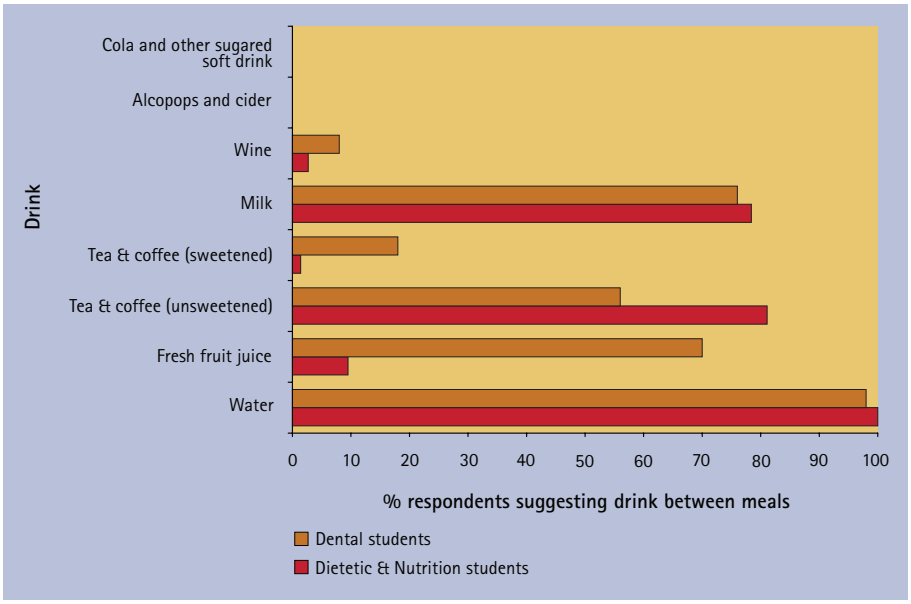

Fig. 3 Percentage respondents suggesting drink as suitable between meals

Fig. 4 The relevance and importance that students place on diet advice

DISCUSSION

The results of this study, with a response rate of just over 75%, provide a fair representation of current nutritional knowledge and practices among dentistry and nutrition students studying at two Cardiff universities. However, it is acknowledged that this study is limited to one geographical location and cannot be taken as directly applicable to all undergraduate courses in dentistry and nutrition/dietetics. It has been observed that significant inter-group differences existed with respect to all aspects of dietary advice. These differences related not only to eating habits and the recommendation of safe snacks and drinks, but also to the disease processes that concerned the respondents. It is not surprising, therefore, that the majority of dental students gave dietary advice to patients only when it was required or requested, rather than as a key component of regular patient care. Furthermore, most dental students gave diet advice regarding oral health in isolation rather than in the context of general health, reflecting the findings of a recent review of the role of the dental team in health promotion in general dental practices.[16]

Between-meal snacks

Even though fresh fruits are of low cariogenicity due to the intrinsic nature of their sugars,[17] a significantly greater proportion of dental students in this study stated that they would not recommend that

patients consume them between meals due to concerns relating to caries and erosion. It should be borne in mind that, although fresh fruits, especially citrus fruits, have been identified as contributing to the aetiology of dental erosion,[18] it is their excessive consumption that produces the most severe effects.[19]

Consideration of bread, pasta, rice and starchy staple foods also led to significant inter-group differences, fewer dietetic and nutrition students recommending them due to their general health concerns, especially in relation to obesity. The UK government recommends the consumption of such foods,[12] especially wholegrain varieties; furthermore there is no epidemiological evidence to suggest that starchy staple foods are harmful to the teeth.[20] Thus, bread, pasta and rice can be recommended as safe snacks by both professional groups as long as they do not contribute excess energy to the diet.

The recommendation of cheese cubes and dried fruit gave rise to some of the greatest inter-group differences. Numerous studies have shown the benefit of cheese to oral health, as little as 5 g of cheese having been shown to be effective against dental caries in children.[21] Against the tide of concern regarding obesity, many authors argue that such a small quantity would make an insignificant contribution to fat intake.[4] However, recommending a small amount of cheese to prevent caries, while recommending reducing total fat intake as part of general health may be a conflict in itself.[22]

In widespread efforts to promote fruit and vegetable consumption, many agencies seem to forget that dried fruit, with approximately 35% non-milk extrinsic sugars and a tendency to stick to teeth, is cariogenic.[19] On the other hand, it is important to note that dried fruit has significant general health benefits due to its fibre, vitamin and mineral content; not recommending it, therefore, could harm the five-a-day message.[22]

Finally, the isolation of the two groups of students in relation to concerns regarding their respective subject areas is further highlighted by a significantly larger proportion of dental students recommending crisps as a safe snack, despite its association with obesity. No health professional should be recommending crisps as a safe snack, especially since a standard 34.5g packet of Walkers™ ready salted crisps contains 10%, 13% and 17% of the guideline daily amount of energy, salt and fat intake respectively of a child aged 5-10 years.[23,24]

Between-meal drinks

It is reassuring that no significant inter-group differences were seen in relation to the recommendation that only water and milk be drunk between meals as this reflects current UK government advice.[25] Significant inter-group differences were, however, observed in relation to the recommendation of fresh fruit juices. The sugars in fruit juices are classified as non-milk extrinsic sugars;[17] fruit juices, therefore, have cariogenic potential. Indeed, some studies have revealed that unsweetened fresh fruit juices may contain as much non-milk extrinsic sugars as standard soft drinks[26] and the erosive potential of fruit juices has been highlighted.[18] Because fresh fruit juice can only contribute to one portion of the five-a-day target (irrespective of the quantity consumed), health professionals should not recommend them as between-meal drinks.

Other significant inter-group differences were seen in relation to tea and coffee. While the majority of dental students would suggest unsweetened tea and coffee to patients, many dietetic and nutrition students were concerned about general health problems such as addiction, anxiety, cardiovascular disease, headaches and reduced nutrient uptake.

Eating habits

Conflicts in dietary advice were seen not only in relation to recommending particular foods and drinks but also to the eating habits that respondents felt were part of a healthy diet. Limiting the frequency of sugars, especially to mealtimes only, would have the two-fold effect of reducing mineral loss and promoting remineralisation during times of no sugar attack.[4] Although all groups recognised the need to limit the quantity of sugar intake, a significantly greater proportion of dental students saw the importance of limiting the frequency of sugar intake as part of a healthy diet. Dietetic and nutrition students felt that eating three to four meals a day was not part of a healthy diet but instead recommended having small frequent meals. Having short frequent meals would not only be harmful to oral health but may have the potential to damage general health if a greater total amount of food energy is consumed than is required.

Relevance and importance of diet advice

The growing global burden of chronic diseases seems to be linked to diets rich in sugars.[27] In addition, the association between a diet predominantly composed of high-fat/sugar/salt foods and obesity has been well established.[28] It was reassuring, therefore, that all the students agreed that diet plays an important causal role in many disease processes and that modification to the diet can prevent many of these. More importantly, most students disagreed that diet advice given by professionals has no effect on the health of individuals and supported the notion that dental teams could contribute to government targets for reducing chronic diseases. While dental teams are well placed to give preventive advice and promote behaviour change, there is little or no evidence of the effectiveness of dental teams in delivering dietary advice.[29] Furthermore, it has been asserted that isolated interventions which merely focus on changing oral health behaviours will not achieve sustainable improvements in oral health.[30] In line with this, the majority of the students agreed that a common risk factor approach would deliver health improvement. Moreover, it may aid in resolving conflicts in health messages.

Training and experiences

A similar percentage of dental students felt that they were confident in giving dietary advice to patients when compared with nutrition students (66% and 68% respectively); even though the majority of the dental students stated that they had only received between one and four hours of training in this subject. It is of some concern that this confidence exists in parallel with inconsistencies in dietary knowledge and attitudes.

Resolving conflicts

Previous authors have expressed concern regarding conflicts between oral health and general health messages.[4] The rationale for such concerns is the negative

impact of conflicts on the behaviour, motivation, attitudes and ultimately health of an individual. Guidance on changing health-related behaviour emphasises that interventions need to be consistent with other local or national interventions to bring about behaviour change.[2] This study has highlighted that inconsistencies exist in the dietary knowledge and attitudes towards dietary advice between dentists and nutritionists; other research has also shown that inconsistencies exist within the same profession.[5]

Obstacles to dental teams' involvement in general health promotion include lack of education[16] and lack of skills.[31] This study reinforced the need for improving applied nutrition training for dental professionals, formulating a uniform set of nutritional guidelines and for improving professional relationships between dentists and nutritionists. Indeed, nutritional assessment must be integral to the practice of a dentist, the oral physician of the twenty-first century.[32]

Until recently, most nutritional guidelines existed in the field of general health, any guidelines in the field of dentistry being limited to oral health. The recent edition of *Delivering better oral health: an evidence-based toolkit for prevention*[33] clarifies diet-related health messages and reduces conflicts. It may, however, be some time before such guidelines become embedded in regular patient care and used widely across different groups of health professionals.

A final way to reduce conflict may be to use a common risk factor approach to health advice as in *Choosing health: making healthy choices easier.*[34] This would also help to address inequalities by improving access.[30]

CONCLUSION

This study highlights and defines concerns regarding the delivery of conflicting health messages in relation to dietary advice. It identifies that significant conflicts exist not only in the recommendation of particular foods and drinks but also in dietary habits and behaviour. Such conflicts, in addition to directly affecting health through the use of wrong messages, can have a detrimental effect on the behaviour, motivation and attitudes of an individual; they seem to be largely due to inadequate training and education of students, the future professionals. Elimination of conflict is crucial if the health of the nation is to be improved. Improved training of students, especially incorporating general health into the training of dentists and oral health into the training of nutritionists, should be an important first step. Furthermore, producing consistent nutrition guidelines which address all aspects of health seems to be appropriate, especially if a common risk factor approach to deliver health improvement is to be adopted.

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